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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/572,690

Applicant(s)

TOURAPIS ET AL.

Examiner

NADER BOLOURCHI

Art Unit

2611

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 December 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 3-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-940)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Remarks

1. Applicant's amendment dated 12/31/2010 is entered.
2. Applicant canceling claim 2 is acknowledged.
3. Claim objections are withdrawn in view of the present amendments..

Response to Arguments

4. Applicant's arguments filed 12/31/2010 have been fully considered but they are not persuasive.
5. In respond to rejection of claims 1-4, 8, and 11, the Applicant refers to amended claims 1 and 8, which now incorporate the features of cancelled claim 2, and contends that (page 6 - emphasis added)

Applicants note that the foregoing statement in Section 4.1 of the Gomila and Kobilansky publication constitutes the only mention of the term "temporal correlation" in this reference. By itself, this statement in the Gomila and Kobilansky publication regarding "temporal correlation" provides no description as to what two quantities are temporally correlated. In particular, the Gomila and Kobilansky publication says nothing regarding the temporal correlation of a current picture with one of a previously displayed or decoded picture, let alone the generation of noise using a factor dependent on such temporal correlation as recited in applicants' claims 1 and 8.

Examiner respectfully disagrees. It is not clear to the Examiner the reason the Applicant refers to description of "two quantities" in regards to the term "temporal correlation". It seems, however, the Applicant argument is based on the description of term "temporal

correlation" used in the primary reference. Examiner asserts that the term "temporal correlation" is indication of the correlation, as it relates to the "time", when different adjacent frames (images) are being correlated, as compared to the term "spatial correlation", which is indication of the correlation, as it relates to the "location", where different portions of the same frame (image) are correlated. Examiner notes that MPEP 2131.01 recites (emphasis added):

2131.01 Multiple Reference 35 U.S.C. 102 Rejections

Normally, only one reference should be used in making a rejection under 35 U.S.C. 102. However, a 35 U.S.C. 102 rejection over multiple references has been held to be proper when the extra references are cited to:

- (A) Prove the primary reference contains an "enabled disclosure;"
- (B) Explain the meaning of a term used in the primary reference, or
- (C) Show that a characteristic not disclosed in the reference is inherent.

See paragraphs I-III below for more explanation of each circumstance.

Accordingly, the Examiner relies upon Jayant et al. (US 7,155,067 B2) in support of his assertion above. Jayant et al. explicitly disclose (col. 1 - emphasis added:)

Fortunately, video signals are typically well suited for 55
standard data compression techniques. Most video signals
include significant data redundancy. Within a single video
frame (image), there typically exists significant correlation
among adjacent portions of the frame, referred to as spatial
correlation. Similarly, adjacent video frames tend to include 60
significant correlation between corresponding image por-
tions, referred to as temporal correlation. Moreover, there is
typically a considerable amount of data in an uncompressed
video signal that is irrelevant. That is, the presence or
absence of that data will not perceivably affect the quality of 65
the output video signal. Because video signals often include
large amounts of such redundant and irrelevant data, video

Therefore, mere fact that a reference recites the term "temporal correlation", means that the current frame (image) is correlated with one of the previously displayed frame. So claim 1 as amended stand rejected.

6. In respond to rejection of claim 14, the Applicant merely argues (page 6 - emphasis added)

The applicants have discussed the Gomila and Kobilansky publication at length above in connection with the 35 U.S.C. § 102(a) rejection of claims 1-4, 8 and 11. Applicants will not repeat that discussion for the sake of brevity, but reiterate that the Gomila and Kobilansky reference says nothing about generating random noise using a factor dependent on the temporal correlation of a current picture with one of a previously displayed or decoded picture as recited in applicants' claims 1, 8 and 14.

Examiner respectfully disagrees. It is not clear to the Examiner the reason the Applicant refers to description of "two quantities" in regards to the term "temporal correlation". It seems, however, the Applicant argument is based on the description of term "temporal correlation" used in the primary reference. Examiner asserts that the term "temporal correlation" is indication of the correlation, as it relates to the "time", when different adjacent frames (images) are being correlated, as compared to the term "spatial correlation", which is indication of the correlation, as it relates to the "location", where different portions of the same frame (image) are correlated. Examiner notes that MPEP 2131.01 recites (emphasis added):

2131.01 Multiple Reference 35 U.S.C. 102 Rejections

Normally, only one reference should be used in making a rejection under 35 U.S.C. 102. However, a 35 U.S.C. 102 rejection over multiple references has been held to be proper when the extra references are cited to:

- (A) Prove the primary reference contains an "enabled disclosure;"
- (B) Explain the meaning of a term used in the primary reference; or
- (C) Show that a characteristic not disclosed in the reference is inherent.

See paragraphs I-III below for more explanation of each circumstance.

Accordingly, The Examiner relies upon Jayant et al. (US 7155067 B2) in support of his assertion above. Jayant et al. explicitly disclose (col. 1 - emphasis added:)

Fortunately, video signals are typically well suited for 55
standard data compression techniques. Most video signals
include significant data redundancy. Within a single video
frame (image), there typically exists significant correlation
among adjacent portions of the frame, referred to as spatial
correlation. Similarly, adjacent video frames tend to include 60
significant correlation between corresponding image por-
tions, referred to as temporal correlation. Moreover, there is
typically a considerable amount of data in an uncompressed
video signal that is irrelevant. That is, the presence or
absence of that data will not perceivably affect the quality of 65
the output video signal. Because video signals often include
large amounts of such redundant and irrelevant data, video

Therefore, mere fact that a reference recites the term "temporal correlation", means that the current frame (image) is correlated with one of the previously displayed frame. So claim 1 as amended stand rejected.

7. Applicant has confined his arguments to the patentability of independent claims 1, 8 and 14, and has waived separate argument of the patentability of claimed limitation

in the dependent claims. (extracts from pages: 8, 9, and 11 of Remarks – emphasis added)

Given that neither the Gomila and Kobilansky publication nor the Gomila publication teach applicants' feature of generating noise using a factor dependent on the temporal correlation of a current picture with one of a previously displayed or decoded picture, the combination of references would not teach all of the features of amended claims 1, 8 and 14. Claims 5 and 6 depend from claim 1, whereas claim 13 depends from claim 8. Therefore, claims 5, 6, and 13 all incorporate by reference features not disclosed by the combination of the Gomila and Kobilansky and the Gomila publications. Therefore, claims 5, 6, 13, and 14 are non-obvious in view of and patentable over the art of record. Applicants respectfully request withdrawal of the 35 U.S.C. § 103(a) rejection of these claims.

The LeBlanc et al. patent says nothing about temporal correlation, let alone nothing about generating random noise using a factor dependent on the temporal correlation of a current picture with one of a previously displayed or decoded picture as recited in applicants' claims 1, 8, and 14. In this regard, the LeBlanc et al. patent adds nothing to the Gomila and Kobilansky publication.

Given that neither the Gomila and Kobilansky publication nor the LeBlanc et al. patent teaches all of the features of applicants' claims 1, 8, and 14, then claims 7, 9-10 and 15, which depend therefrom, respectively, patentably distinguish over the art of record. Applicants respectfully request withdrawal of the 35 U.S.C. § 103(a) rejection of claims 7, 9-10, and 15.

Film Grain Encoding: syntax and results, fails to teach the feature of generating random noise using a factor dependent on the temporal correlation of a current picture with one of a previously displayed or decoded picture. Thus, regardless of which Gomila publication the examiner chooses to rely, neither reference, nor their combination with the Bjontegaard publication, would teach all of the features of applicants' claim 8, nor claim 12 that depends therefrom. For this reason, applicants respectfully request withdrawal of the 103a rejection of claim 12.

Accordingly, dependent claims 3-7, 9-13 and 15 are grouped together and stand or fall with independent claims 1, 8 and 14..

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

8. Claims 1, 3-4, 8, and 11 are rejected under 35 U.S.C. 102(a) as being anticipated by Gomila et al.(C . Gomila and A. Kobilansky, "SEI message for film grain encoding", document JVT-H022, JVT of ISO/IEC MPEG & ITU-R VCEG, Geneva, Switzerland, May 23-27, 2003).

Regarding claim 1, Gomila et al. disclose a method for reducing artifacts in a video stream (page 2, lines 5-21; Examiner notes that the artifacts are the missing film grain in the decoded images because as described in page 3 – emphasis added:

According to the proposed strategy, supplemental information describing film grain of the original sequence is encoded in an SEI message defined by a Professional Extension of the JVT. This strategy requires the encoder to parameterize the film grain of the original sequence and the decoder to simulate the film grain according to a pre-defined model. To accomplish the film grain parameterization the encoder may need to perform an additional step in which the film grain is removed from the original source (Figure 1). In another strategy, the encoder may simply reuse the reconstructed images to model not the original film grain, but the film grain that has been suppressed by the encoding process (Figure 2). Note that the strategy implemented at the encoder is non-normative.

i.e., the disclosed method by Gomila is well suitable for reducing artifacts), comprising the steps of: decoding the video stream (Figure 1 "Decoding"); and adding random noise (page 5; equation (2) where "N is a random value" in page 5: line 35) to at least one pixel in a picture in the video stream following decoding (Figure 1, "Film grain simulation"; page 3: line 27 "film grain simulation (decoder)" section) in an amount correlated to luminance information of at least a portion of a current picture (page 5 – emphasis added):

In a first approach, we propose to use second order auto regression to model spatial correlation and first order regression to model cross-color and temporal correlations. All correlation factors depend on intensity of the decoded image. Horizontal and vertical spatial correlation factors are related by a constant aspect ratio factor.

According to that, we suggest using the following formula to calculate the simulated grain value,

$$(2) \quad G(x, y, c, t, L) = p(c, L) * N + q(c, L) * (G(x-1, y, c, t, L) + A * G(x, y-1, c, t, L)) + r(c, L) * (A * G(x-1, y-1, c, t, L) + G(x+1, y-1, c, t, L)) + s(c, L) * (G(x-2, y, c, t, L) + A * A * G(x, y-2, c, t, L)) + u(c, L) * G(x, y, c-1, t, L),$$

where N is a random value with normalized Gaussian distribution, A is a constant pixel aspect ratio, p, q, r, s and u are correlation parameters. Parameter u is always zero for the first color channel, and grain value G assumed to be 0 whenever any index is out of range.

; see also page 4 section "Noise intensity" regarding the dependency of the amount of noise on the image intensity). Gomila et al. also disclose the step of correlating the noise using a factor dependent on the temporal correlation of the current picture image

with one of a previously displayed or decoded picture. (page 5 – emphasis added:

In a first approach, we propose to use second order auto regression to model spatial correlation and first order regression to model cross-color and temporal correlations. All correlation factors depend on intensity of the decoded image. Horizontal and vertical spatial correlation factors are related by a constant aspect ratio factor.

According to that, we suggest using the following formula to calculate the simulated grain value.

$$(2) \quad G(x, y, c, t, L) = p(c, L) * N + \\ q(c, L) * (G(x-1, y, c, t, L) + A * G(x, y-1, c, t, L)) + \\ r(c, L) * (A * G(x-1, y-1, c, t, L) + G(x+1, y-1, c, t, L)) + \\ s(c, L) * (G(x-2, y, c, t, L) + A * A * G(x, y-2, c, t, L)) + \\ u(c, L) * G(x, y, c-1, t, L),$$

where N is a random value with normalized Gaussian distribution, A is a constant pixel aspect ratio, p, q, r, s and u are correlation parameters. Parameter u is always zero for the first color channel, and grain value G assumed to be 0 whenever any index is out of range.

As can be seen from the structure of equation (2), grain values for a given pixel in a given color channel are calculated recursively using previously calculated grain values. Specifically, frames are calculated in order of increasing t. Within each frame, color channels are processed in order of increasing c. Within each color channel, pixels are rasterized horizontally and then vertically in order of increasing x and y. When this order is followed, all grain values required by equation (2) are automatically calculated in advance.

)

Regarding claim 3, Gomila et al. disclose as stated in rejection of claim 2 above. Gomila et al. also disclose the correlation factor is established in accordance with one of a luma or color component. (see “C” and “L” in “correlation parameters” in page 5, equation 2 – emphasis added:

In order to be able to interpret the set of parameters in the SEI message, the generator function requires specification of a generator model. Specifically, let (x, y, c, t) be the decoded image pixel value at image position (x, y) , color channel c, and frame number t. For convenience, we will assume that pixel values are scaled to have maximum value of 1. Further discussion is oriented at RGB image representation (c = 1, 2, or 3), although may be directly applied to monochromatic images and, with obvious modifications, to YUV representation.

where $L(x, y, t)$ is a measure of local intensity in the image. One possible implementation is to define L as luminance, or a weighted sum of intensities (x, y, c, t) over all color channels.

)

Regarding claim 4, Gomila et al. disclose as stated in rejection of claim 2 above. Gomila et al. also disclose the step of adding noise to a color component of the picture in accordance with a luma component. (see "L" in equation 2)

Regarding claim 8, Gomila et al. disclose a decoder arrangement for decoding a coded video stream to yield reduced artifacts, (page 2, lines 5-21; Examiner notes that the artifacts are the missing film grain in the decoded images because as described in page 2 – emphasis added:

According to the proposed strategy, supplemental information describing film grain of the original sequence is encoded in an SEI message defined by a Professional Extension of the JVT. This strategy requires the encoder to parameterize the film grain of the original sequence and the decoder to simulate the film grain according to a pre-defined model. To accomplish the film grain parameterization the encoder may need to perform an additional step in which the film grain is removed from the original source (Figure 1). In another strategy, the encoder may simply reuse the reconstructed images to model not the original film grain, but the film grain that has been suppressed by the encoding process (Figure 2). Note that the strategy implemented at the encoder is non-normative.

i.e., the disclosed method by Gomila is well suitable for reducing artifacts), comprising the steps of: decoding the video stream (Figure 1" "Decoding"); comprising: a video decoder for decoding an incoming coded video stream to yield decoded pictures (Figure 1" "Decoding"); a reference picture store for storing at least one previously decoded picture for use by the decoder in decoding future pictures, (page 8 – emphasis added:

Figure 6 shows the compression curve obtained by ranging the QP values from 16 to 30. The following parameters were selected to configure the JM6.1a encoder:

GOP: 16 frames (IPBBPBB)
Number of reference frames: 2
Search range: 32
Direct mode type: spatial
Entropy coding method: CABAC
Context init method: adaptive

Which means the used corresponding decoder (see the underlined encoder above) must have (implicitly) a reference picture (see underlined reference frame) stored as well, if it will be able to decode the bitstream successfully); a noise generator noise for generating random noise (page 5:, equation (2) where "N is a random value" in page 5: line 35) for addition to at least one pixel in a decoded picture (Figure 1, "Film grain simulation"; page 3: line 27 "film grain simulation (decoder)"; page 5 – emphasis added

Assuming an additive grain model, grain simulation changes each pixel value to

$$(1) \quad \tilde{I}(x, y, c, t) = I(x, y, c, t) + G(x, y, c, t, L(x, y, t)),$$

)

in an amount correlated to luminance information of at least a portion of a current picture; (page 5 – emphasis added

In a first approach, we propose to use second order auto regression to model spatial correlation and first order regression to model cross-color and temporal correlations. All correlation factors depend on intensity of the decoded image. Horizontal and vertical spatial correlation factors are related by a constant aspect ratio factor.

According to that, we suggest using the following formula to calculate the simulated grain value,

$$(2) \quad G(x, y, c, t, L) = p(c, L) * N + \\ q(c, L) * (G(x-1, y, c, t, L) + A * G(x, y-1, c, t, L)) + \\ r(c, L) * (A * G(x-1, y-1, c, t, L) + G(x+1, y-1, c, t, L)) + \\ s(c, L) * (G(x-2, y, c, t, L) + A * A * G(x, y-2, c, t, L)) + \\ u(c, L) * G(x, y, c-1, t, L),$$

where N is a random value with normalized Gaussian distribution, A is a constant pixel aspect ratio, p, q, r, s and u are correlation parameters. Parameter u is always zero for the first color channel, and grain value G assumed to be 0 whenever any index is out of range.

) using a factor dependent on the temporal correlation of the current picture image with one of a previously displayed or decoded picture. (page 5 – emphasis added:

In a first approach, we propose to use second order auto regression to model spatial correlation and first order regression to model cross-color and temporal correlations. All correlation factors depend on intensity of the decoded image. Horizontal and vertical spatial correlation factors are related by a constant aspect ratio factor.

According to that, we suggest using the following formula to calculate the simulated grain value,

$$(2) \quad G(x, y, c, t, L) = p(c, L) * N + \\ q(c, L) * (G(x-1, y, c, t, L) + A * G(x, y-1, c, t, L)) + \\ r(c, L) * (A * G(x-1, y-1, c, t, L) + G(x+1, y-1, c, t, L)) + \\ s(c, L) * (G(x-2, y, c, t, L) + A * A * G(x, y-2, c, t, L)) + \\ u(c, L) * G(x, y, c-1, t, L),$$

where N is a random value with normalized Gaussian distribution, A is a constant pixel aspect ratio, p, q, r, s and u are correlation parameters. Parameter u is always zero for the first color channel, and grain value G assumed to be 0 whenever any index is out of range.

As can be seen from the structure of equation (2), grain values for a given pixel in a given color channel are calculated recursively using previously calculated grain values. Specifically, frames are calculated in order of increasing t. Within each frame, color channels processed in order of increasing c. Within each color channel, pixels are rasterized horizontally and then vertically in order of increasing x and y. When this order is followed, all grain values required by equation (2) are automatically calculated in advance.

) a noise picture store for storing the noise information for subsequent use by the noise generator (see "N is a random value" in page 5, lines 29-37 and page 6: equation 3; Examiner notes that the noise in spatial and temporal correlations of previously calculated grain value of a pixel is used to generate the noise at the current pixel position, as disclosed in page 5: - emphasis added:

In a first approach, we propose to use second order auto regression to model spatial correlation and first order regression to model cross-color and temporal correlations. All correlation factors depend on intensity of the decoded image. Horizontal and vertical spatial correlation factors are related by a constant aspect ratio factor.

According to that, we suggest using the following formula to calculate the simulated grain value,

$$(2) \quad G(x, y, c, t, L) = p(c, L) * N + \\ q(c, L) * (G(x-1, y, c, t, L) + A * G(x, y-1, c, t, L)) + \\ r(c, L) * (A * G(x-1, y-1, c, t, L) + G(x+1, y-1, c, t, L)) + \\ s(c, L) * (G(x-2, y, c, t, L) + A * A * G(x, y-2, c, t, L)) + \\ u(c, L) * G(x, y, c-1, t, L),$$

where N is a random value with normalized Gaussian distribution, A is a constant pixel aspect ratio, p, q, r, s and u are correlation parameters. Parameter u is always zero for the first color channel, and grain value G assumed to be 0 whenever any index is out of range.

As can be seen from the structure of equation (2), grain values for a given pixel in a given color channel are calculated recursively using previously calculated grain values. Specifically, frames are calculated in order of increasing t. Within each frame, color channels are processed in order of increasing c. Within each color channel, pixels are rasterized horizontally and then vertically in order of increasing x and y. When this order is followed, all grain values required by equation (2) are automatically calculated in advance.

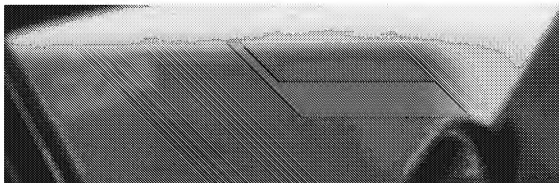
therefore, in order to enable the reuse of the noise it must be stored for every pixel, which means a noise picture store is implicitly (inherently) given); a summing block for summing the noise generated by the noise generator with a decoded picture from the decoder (see "+" in equations 1, 2 and 3); and a clipper for clipping the summed noise and decoded picture. (Examiner notes that a clipper is implicitly present and inherently included, because the noise has a predetermined variance using such clipper, as disclosed in page 6 – emphasis added

In Figure 3, film grain samples were obtained by first order auto-regression, the noise being added in the RGB logarithmic color space. In (a), the variance of the random noise was set to values 0.05, 0.08, 0.11 and 0.14. In (b), the color of the grain is studied: in (b1), G and B were fully correlated to R, so the grain is perceived monochromatic; in (b2), G and B were partially correlated to R; in (b3) G was fully correlated to R, while B is uncorrelated; as a result grain is perceived gray, yellow or blue. Finally in (b4), the three color components were uncorrelated.

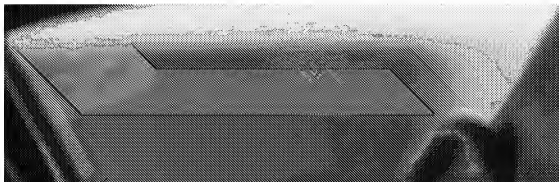
Without clipper, there will be no restriction to the maximum value of the noise amplitude.

Therefore, the noise, added to the decoded pictures, led to strong visible artifacts in

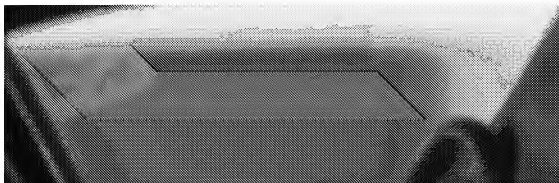
dark and light regions of the output images. However, no such artifacts are visible in the images of Figure 8:



(a) QP28 + film grain generated by the auto-regressive model



(b) QP28 + film grain generated by filtering Gaussian noise



(c) Original

Which is due to use of the clipper use).

Regarding claim 11, Gomila et al. disclose as stated in rejection of claim 8 above.

Gomila et al. also disclose wherein the noise generator generates noise in accordance with decoded pictures and bit stream information supplied from the decoder (page 5, equation 2 – emphasis added:

In order to be able to interpret the set of parameters in the SEI message, the generator function requires specification of a generator model. Specifically, let $\{x, y, c, t\}$ be the decoded image pixel value at image position (x, y) , color channel c , and frame number t . For convenience, we will assume that pixel values are scaled to have maximum value of 1. Further discussion is oriented at RGB image representation ($c = 1, 2, \text{ or } 3$), although may be directly applied to monochromatic images and, with obvious modifications, to YUV representation.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 5, 6, 13, and 14 are rejected under 35 U.S.C. 102(a) as being unpatentable over Gomila (C. Gomila, "SEI message for film grain encoding", document JVT-I013r2, JVT of ISO/IEC MPEG & ITU-R VCEG, California, USA, September 2-5, 2003) in view of Gomila et al. (C. Gomila and A. Kobilansky, "SEI message for film grain encoding", document JVT-H022, JVT of ISO/IEC MPEG & ITU-R VCEG, Geneva, Switzerland, May 23-27, 2003).

Regarding claim 5, Gomila et al. disclose as stated in rejection of claim 2 above. Gomila et al. do not explicitly disclose wherein the correlation factor is first established on an $N \times N$ pixel picture block basis (where N is an integer) prior to interpolation of the

additive noise. Gomila, in the same field of endeavor (Examiner notes that the subject matter disclosed by Gomila is based on Gomila et al. disclosure - see page 1, paragraph 3 of Gomila and page 6 of Gomila et al.), discloses the correlation factor is first established on an N.times.N pixel picture block basis ("...each block of 16x16 pixels..." in page 3, last two pars.). Therefore, it would have been obvious to one of the ordinary skills in the art to include the teaching of Gomila et al. in those disclosed by Gomila in order to generate the claimed invention with a reasonable expectation of success.

Regarding claim 6, Gomila et al. disclose as stated in rejection of claim 1 above. Gomila et al. do not explicitly disclose the step of adjusting the noise based on the intensity of an N.times.N block (where N is an integer) of adjacent pixels. Gomila, in the same field of endeavor (Examiner notes that the subject matter disclosed by Gomila is based on Gomila et al. disclosure - see page 1, paragraph 3 of Gomila and page 6 of Gomila et al.), discloses adjusting the noise based on the intensity of an N.times.N block ("...each block of 16x16 pixels..." in page 3, last two pars.). Therefore, it would have been obvious to one of the ordinary skills in the art to include the teaching of Gomila et al. in those disclosed by Gomila in order to generate the claimed invention with a reasonable expectation of success.

Regarding claim 13, Gomila et al. disclose as stated in rejection of claim 8 above. Gomila et al. do not explicitly disclose further including a second picture store for storing

an N.times.N pixel block picture average, where N is an integer, for use by the noise generator. Gomila, in the same field of endeavor (Examiner notes that the subject matter disclosed by Gomila is based on Gomila et al. disclosure - see page 1, paragraph 3 of Gomila and page 6 of Gomila et al.), discloses adjusting the noise based on the intensity of an N.times.N block ("...each block of 16x16 pixels..." in page 3, last two pars; Examiner note that the memory is implicitly included.). Therefore, it would have been obvious to one of the ordinary skills in the art to include the teaching of Gomila et al. in those disclosed by Gomila in order to generate the claimed invention with a reasonable expectation of success.

Regarding claim 14, Gomila discloses a decoder arrangement for decoding a coded video stream to yield reduced artifacts (section 1: par. 1), comprising: a video decoder for decoding an incoming coded video stream to yield decoded pictures; (section 3: par. 1); a reference picture store for at least one storing at least one previously decoded picture for use by the decoder in decoding future pictures, (page 5 – emphasis added:

In this section, we present the obtained results on five sequences from the test set used in the JV/T PExt. Sequences were encoded with 8 bits (dropping the 2 LSB) using the JM6.1a version of the reference software. The following parameters were selected to configure the JM6.1a encoder:

GOP: 24 frames (IPSPBB)
Number of reference frames: 2
Search range: 32
Direct mode type: spatial
Entropy coding method: CABAC

Which means the used corresponding decoder (see the underlined encoder above) must have (implicitly) a reference picture (see underlined reference frame) stored as well, if it will be able to decode the bitstream successfully); a noise generator noise for

generating noise in accordance with decoded pictures (page 3: lines 1 -5, page 3: line 28 , page 4, line 13) and bit stream information from the decoder for addition to at least one pixel in the decoded picture ("SEI message" in page 2: lines 1-3 is part of the bitstream) using a factor dependent on the temporal correlation of the current picture image with one of a previously displayed or decoded picture. (page 5 – emphasis added):

In a first approach, we propose to use second order auto regression to model spatial correlation and first order regression to model cross-color and temporal correlations. All correlation factors depend on intensity of the decoded image. Horizontal and vertical spatial correlation factors are related by a constant aspect ratio factor.

According to that, we suggest using the following formula to calculate the simulated grain value.

$$(2) \quad G(x, y, c, t, L) = p(c, L) * N + q(c, L) * (G(x-1, y, c, t, L) + A * G(x, y-1, c, t, L)) + r(c, L) * (A * G(x-1, y-1, c, t, L) + G(x+1, y-1, c, t, L)) + s(c, L) * (G(x-2, y, c, t, L) + A * A * G(x, y-2, c, t, L)) + u(c, L) * G(x, y, c-1, t, L),$$

where N is a random value with normalized Gaussian distribution, A is a constant pixel aspect ratio, p, q, r, s and u are correlation parameters. Parameter u is always zero for the first color channel, and grain value G assumed to be 0 whenever any index is out of range.

As can be seen from the structure of equation (2), grain values for a given pixel in a given color channel are calculated recursively using previously calculated grain values. Specifically, frames are calculated in order of increasing t. Within each frame, color channels processed in order of increasing c. Within each color channel, pixels are rasterized horizontally and then vertically in order of increasing x and y. When this order is followed, all grain values required by equation (2) are automatically calculated in advance.

) a picture store for storing an N x N pixel block picture average, where N is an integer, for use by the noise generator, ("...each block of 16x16 pixels..." in page 3, last two pars.) a summing block for summing the noise generated by the noise generator with a decoded picture from the decoder. ("+" in equation (1); page 3, lines 1-5). Gomila do not explicitly disclose that the noise generator generates noise in an amount correlated to additive noise of at least one pixel in a prior picture.

However, one of the ordinary skills in the art would recognize that the problem to solve by the claim invention is how to reduce the artifact of temporal flickering due to the added noise. Gomila et al., in the same field of endeavor (Examiner notes that the subject matter disclosed by Gomila is based on Gomila et al. disclosure - see page 1, paragraph 3 of Gomila and page 6 of Gomila et al.) solve the problem by correlating the amount of the current noise to the noise of the previous frame using a temporal correlation factor v (DI: page 6, lines 6-11). Therefore, it would have been obvious to one of the ordinary skills in the art to include the teaching of Gomila et al. in those disclosed by Gomila in order to solve the problem posed.

10. Claims 7, 9, and 10 are rejected under 35 U.S.C. 102(a) as being unpatentable over Gomila (C. Gomila, "SEI message for film grain encoding", document JVT-I013r2, JVT of ISO/IEC MPEG & ITU-R VCEG, California, USA, September 2-5, 2003) in view of LeBlanc et al. (US 7,773,741 B1).

Regarding claim 7, Gomila et al. disclose as stated in rejection of claim 1 above. Gomila et al. do not explicitly disclose wherein the amount of noise is correlated using an approximation of a Finite Impulse Response (IIR) filter. However, use of IIR filter for correlator for comfort noise generator is well known in the art, as disclosed by LeBlanc et al. Therefore, it would have been obvious to one of the ordinary skills in the art to include the IIR filter of LeBlanc et al. as the filter of Gomila et al. in order to generate the claimed invention with a reasonable expectation of success.

Regarding claim 9, Gomila et al. disclose as stated in rejection of claim 1 above. Gomila et al. do not explicitly disclose wherein the noise generator implements an instantiation of a Finite Impulse Response filter. However, use of IIR filter for correlator for comfort noise generator is well known in the art, as disclosed by LeBlanc et al. Therefore, it would have been obvious to one of the ordinary skills in the art to include the IIR filter of LeBlanc et al. as the filter of Gomila et al. in order to generate the claimed invention with a reasonable expectation of success.

Regarding claim 10, Gomila et al. disclose as stated in rejection of claim 1 above. Gomila et al. do not explicitly disclose wherein the noise generator implements an approximation of an Infinite Impulse Response filter. However, use of IIR filter for correlator for comfort noise generator is well known in the art, as disclosed by LeBlanc et al. Therefore, it would have been obvious to one of the ordinary skills in the art to include the IIR filter of LeBlanc et al. as the filter of Gomila et al. in order to generate the claimed invention with a reasonable expectation of success.

11. Claim 12 is rejected under 35 U.S.C. 102(a) as being unpatentable over Gomila (C. Gomila, "SEI message for film grain encoding", document JVT-I013r2, JVT of ISO/IEC MPEG & ITU-R VCEG, California, USA, September 2-5, 2003) in view of Bjontegaard (GISLE BJONTEGAARD: "Addition of comfort noise as post processing", ITU-T SG 16, VIDEO CODING EXPERTS GROUP, DOCUMENT Q15B15, Sunriver, Oregon, USA, Sep. 8-11, 1997),

12. Regarding claim 12, Gomila et al. disclose as stated in rejection of claim 8 above. Gomila et al. do not explicitly disclose wherein the bit stream information comprises a quantization parameter. Bjontegaard, in the same field of endeavor, the bit stream information comprises a quantization parameter (see QUANT parameter in calculation of integer I_1 in page 1, section 2). Therefore, it would have been obvious to one of the ordinary skills in the art to include quantization parameter of the teaching of Bjontegaard, in the bit stream of Gomila et al. in those disclosed by Gomila in order to generate the claimed invention with a reasonable expectation of success.

13. Claim 15 is rejected under 35 U.S.C. 102(a) as being unpatentable over Gomila et al. (C. Gomila and A. Kobilansky, "SEI message for film grain encoding", document JVT-H022, JVT of ISO/IEC MPEG & ITU-R VCEG, Geneva, Switzerland, May 23-27, 2003) in view of LeBlanc et al. (US 7,773,741 B1).

Regarding claim 15, Gomila et al. disclose as stated in rejection of claim 14 above. Gomila et al. do not explicitly disclose wherein the noise generator implements an instantiation of a Finite Impulse Response filter. However, use of IIR filter for correlator for comfort noise generator is well known in the art, as disclosed by LeBlanc et al. (US 7,773,741 B1). Therefore, it would have been obvious to one of the ordinary skills in the art to include the IIR filter of LeBlanc et al. as the filter of Gomila et al. in order to generate the claimed invention with a reasonable expectation of success.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. LeBlanc; Wilf et al. (US 7773741 B1); Tavares; Clifford (US 7,020,207 B1); Lin; Wanrong et al. (US 6,944,226 B1); Hoang; Dzung (US 6,295,089 B1); Thompson; John E. (US 3,562,420 A); Boyce; Jill Macdonald et al. (US 2006/0256871 A1)

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nader Bolourchi whose telephone number is (571) 272-8064. The examiner can normally be reached on M-F 8:30 to 4:30.

17. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David. C. Payne can be reached on (571) 272-3024. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

18. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at (866) 217-9197 (toll-free).

/N. B./
Examiner, Art Unit 2611

/David C. Payne/
Supervisory Patent Examiner, Art Unit 2611